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ELEMENTARY SCHOOL TEACHER'S OBSTACLES IN THE IMPLEMENTATION OF PROBLEM-BASED LEARNING MODEL IN MATHEMATICS LEARNING

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Abstract

This study aims to describe the teachers' obstacles in applying problem-based learning model in Mathematics learning of elementary schools. This method of this study was a qualitative descriptive. The data sources were three third-grade teachers of the elementary schools. The data analysis consisted of stages of data collection, data reduction, data presentation, and data verification. The results of the study show: in the planning stage, obstacles occur when teachers need careful preparation in making learning plans and determining problems at the beginning of learning. In the implementation phase, the obstacle that occurs is a lack of time in maximizing activities in all phases. The teacher finds it difficult to direct students to problems that require solutions. Teachers need enough time to organize students in group activities. Also, they have difficulty dividing time when guiding groups because students are still waiting for the teacher to explain to the group without doing it themselves first. Another difficulty faced is making students actively ask questions or respond to learning activities, and feedback from problem-solving is less profound.

Keywords: Elementary school, Problem-based learning, Teachers' obstacles.

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan hambatan guru dalam menerapkan model pembelajaran *problem-based learning* pada pembelajaran matematika di sekolah dasar. Penelitian ini merupakan penelitian deskriptif kualitatif. Sumber data adalah tiga guru sekolah dasar kelas tiga di kecamatan banjarsari kota Surakarta. Analisis data yang dilakukan mulai dari tahap pengumpulan data, pereduksian data, penyajian data, dan verifikasi data. Hasil penelitian menunjukkan: pada tahap perencanaan, kendala terjadi ketika para guru membutuhkan persiapan yang cermat dalam membuat perencanaan pembelajaran dan menentukan masalah pada awal pembelajaran. Pada tahap implementasi, kendala yang terjadi adalah kurangnya waktu dalam memaksimalkan kegiatan di semua fase. Guru merasa kesulitan untuk mengarahkan siswa ke masalah yang membutuhkan solusi. Guru membutuhkan waktu yang cukup untuk mengatur siswa dalam kegiatan kelompok. Selain itu mereka mengalami kesulitan untuk membagi waktu pada saat membimbing kelompok karena siswa masih menunggu guru untuk menjelaskan kepada kelompok tanpa melakukannya sendiri terlebih dahulu. Kesulitan lain yang dihadapi adalah membuat siswa secara aktif bertanya atau merespons kegiatan pembelajaran, dan umpan balik dari penyelesaian masalah kurang mendalam.

Kata kunci: Hambatan guru, *Problem-based learning*, Sekolah dasar.

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Mathematics is one of the subjects that has an important role in education (Eviyanti, *et al.* 2017; Muhtadi, *et al.* 2017). Mathematics takes the role as a tool to organize our daily lives in society (Risdiyanti & Prahmana, 2018). We use Mathematics as a tool in many jobs and also in making calculated decisions (Ali, 2013). The ability to solve mathematical problems is very important. Many efforts have been implemented intensively and sustainably by the Indonesian government to improve

education (Darma, 2018). Therefore, mathematical problem solving is the necessary ability for students and becomes important to learn.

The Regulation of the Indonesian Ministry of Education and Culture Number 22 of 2006 concerning the Content Standard for Primary and Secondary Education states that Mathematics learning is provided to promote learners using logical, analytical, systematic, critical, and creative thinking ability as well as the ability to work together. Thus, the learners can have the ability to obtain, manage, and utilize the information to survive in a situation that always changes, uncertain, and competitive (Ahamad, *et al.* 2018). The achievement of those competencies is in the form of increased knowledge, skills, and attitude development through the learning process.

Based on the regulation, problem-solving is a focus on Mathematics learning. In increasing the problem-solving ability, students need to develop several skills, namely the skill to comprehend the problem, creating Mathematical models, solving the problems, and interpreting the Solutions (Widodo, *et al.* 2019). In any chances, Mathematical learning should begin with the introduction of problems that are appropriate to the students' real situation (contextual problem).

NCTM (2000) asserts the importance of mathematical problem-solving, which states that problem-solving is an integral part of Mathematics learning. Therefore, it should not be separated from mathematics learning. Also, problem-solving skills are the goals of mathematics learning. Mathematical problems are tools that are used not only to help the students develop their thinking skills but also help them to develop their basic skills in solving problems, especially problems in their daily life (Pimta, Tayraukham, & Nuangchalerm, 2009; Muhtadi, *et al.* 2017; Shahrill, *et al.* 2018).

Based on the research of PISA (Program for International Student Assessment) in 2015, Indonesia is ranked 62 out of 70 countries participating in PISA (OECD, 2018). The average score of mathematics achievement of all countries is 490; meanwhile, the average score of mathematics students in Indonesia is to 386. Based on that description, Indonesia's ranking is still far below the international average. It means that the mathematics ability of Indonesian students is still low. Therefore, the mathematics learning process in elementary schools needs improvement. Mathematics learning should be designed according to the goals that are listed in the curriculum.

Low mathematics learning achievement is caused by several factors that influence the learning process. Based on interview results, the learning is still dominated by material explanations using lectures method. The teacher has not implemented the meaningful learning that was done by starting the learning through the presentation of problems related to daily life so that the learners were easy to remember the material. The teacher has not allowed the students to think freely to look for the concepts and solve the problems that were related to the presented material. The presentation of problems that are not by the learners' daily life makes it difficult for the students to apply their knowledge in the real world. The students are less skilled to ask during the learning process. The students have not been brought into real situations during the learning process. The students tend to

memorize the formulas to solve the problems so that they have the difficulties in facing the developed problem. And moreover, the teachers tend not to enable the students to solve the problems.

The problems can be overcome using the innovative learning model. The innovative and fun learning models can support learning to be more meaningful for the learners. Not all of the learning models are appropriate and suitable to be applied in solving mathematical problems. Problem-based learning is a suitable learning model that is used to overcome mathematics problems. Problem-Based learning requires the teachers to apply meaningful learning by presenting the problems related to the learners' daily life. The teachers also have to fully give the students a chance to think freely to find the concept as well as solve the problem. Padmavathy & Mareesh (2013) describes problem-based learning that is believed to create the learning environment where the problems can encourage learning. In sum up, learning begins with a problem to be solved, and the posed problem can be the way for the students to acquire new knowledge before they can solve the existing problems. The students prefer interpreting the problem, gathering the required information, identifying the possible solutions, evaluating options, and presenting conclusions instead of looking for the one that correctly answers the question.

In applying the problem-based learning model, it is necessary to know the existing obstacles to make it easier in finding the solution for learning. It is required to conduct the learning optimally. If the implementation of the current learning model experiences several obstacles, the teachers need to analyze and find the right solutions. Therefore, student achievement can be attained optimally according to the purpose of learning. Wijayanti, Roemintoyo, & Murwaningsih (2017) explains that teachers can choose a learning model that can support teaching and learning activities that can be effectively managed. Based on Allen, Donham, & Bernhardt (2011), teachers should project different roles of students in group work; these analyzes can more accurately indicate which areas of study are possible for them. This study aims to describe the teachers' obstacles in applying problem-based learning model in mathematics learning of elementary schools.

METHOD

Research design

The type of this study was qualitative descriptive that was aimed to describe the teachers' obstacles in applying the Problem-Based Learning model in Mathematics learning of the elementary school. This study was conducted at the public elementary school in Banjarsari sub-district of Surakarta.

Research sample

The sampling technique was purposive random sampling, which represented the elementary school population in Banjarsari sub-district, which was taken from three categories, namely high, medium, and low quality. The Elementary Schools that were used in this study were SDN Madyotaman, SDN Bromantakan, and SDN Bibisluhur I. The subject of study was the third-grade teacher in the current elementary school.

The data validity test used triangulation technique. The methods used were observation, data

documentation, and interview. The researcher examined the validity of the data by examining the observation data, data document, and the interview result about the teachers' obstacles in applying the Problem-Based Learning model in Mathematics learning of the third-grade of elementary school. Observation is a method done by the researcher to observe the learning process of social science of natural and artificial environment by applying Problem-Based learning model. An interview is a method done by the researcher to obtain the data by conducting the oral question and answer process between the researcher as an interviewer and the third-grade teachers as the informants. The interview was conducted at the last meeting after the teacher applied the problem-based learning model. Meanwhile, the interviews were conducted individually in which each of the third-grade teachers in each school was interviewed directly by the researcher through in-depth, free, and clear interviews without any interference from others. The observation, data document, and interview instruments were adapted using the syntax of problem-based learning model, which consists of five phases.

Data analysis

The data analysis techniques were interactive analysis model of Miles & Huberman (1994) through data collection, data reduction, data presentation, and data verification. The results of data analysis of the research were presented using qualitative descriptive with narrative text to depict teachers' obstacles in applying problem-based learning model in mathematics learning of the elementary school.

RESULT AND DISCUSSION

The results of the study are grouped into two sub-chapter, namely the planning stage and implementation stage in the implementation of problem-based learning.

The planning stage of the problem-based learning model

The learning process will be well-conducted if the teacher prepares the lesson carefully by making the lesson plan. It is in line with the statement of the teacher of SDN Bibisluhur I stating that the problem-based learning model can work well when the teachers prepare all the documents well. However, preparing the learning document also takes a long time. It is proven by the following transcript:

"The implementation of the problem-based learning model will be maximized if all of the learning document are well-prepared and well-planned, whereas making a good learning tool takes a long time."

Mutholib, Sujadi, & Subanti (2017) mentions that teachers are an important factor in the implementation of the curriculum. Therefore, how the teachers teach and how they use the learning models in Mathematics will affect the students' understanding. Thus, the teachers need to make the lesson plan to make the maximal learning to achieve the learning objectives.

Teachers were reluctant to use the problem-based learning model because the preparation was quite complicated and time-consuming. In making lesson plans, the teachers needed to create the

problems that will be solved by the students. The obstacles experienced by teachers is in determining the right problem for Mathematics learning using the method of problem-based learning. The teachers preferred to use the problem on the subject matter of the textbook. It was supported by the statement of the teachers of SDN Bromantakan that said:

"Usually, the problem for learning is only taken from the book. It is due to the difficulty in determining the problems in problem-based learning that needs to pay attention to certain criteria".

Yusof *et al.* (2012) explains that learning with a problem-based learning model begins with an unstructured problem that has more than one answer. Learning using problem-based learning model is an effective learning method to face the challenges of the 21st century. Napitupulu, Suryadi, & Kusumah (2016) explains that problem-based learning is an instructional approach which uses problems to trigger the learning. The students collaboratively work in groups to solve the problems. Teachers play their part to facilitate the learning using scaffolding techniques by providing indirect directions or posing questions to stimulate the students to use their reasoning and experience to explore the possible ways to get the temporary or final solutions.

By implementing the problem-based learning model, the students are trained to think through the learning process stage. Therefore, the learning process must be given precedence. The learning objectives that are not achieved are also considered as the teachers' general obstacles in implementing the problem-based learning model.

The implementation stage of problem-based learning

According to Hosnan (2014), five phases are conducted during the learning process of the students' orientation phase on the problem in the Problem-Based Learning model, namely organizing the students to learn, guiding individual and group investigations, developing and presenting the work, and analyzing and evaluating the problem-solving process. Learning activities through problem-based learning model began with student activities to solve the real problems that have been made previously. The process of problem-solving has the implications for the formation of student skills in solving problems, stimulating critical thinking, and forming new knowledge. However, there were some obstacles experienced by the teachers in the implementation of the problem-based learning model. It is presented in Table 1 based on observations and interviews.

Table 1. Obstacles in the application of problem-based learning model

Phases in PBL	SDN Madyotaman	SDN Bromantakan	SDN Bibisluhur I
Orientation the students upon the problem	Delivering the students to the problems	Involving the students in problem-solving activities	Giving the understanding related to the problems
Organizing the students to learn	Dividing the students into groups, requiring the time	Ask the students to make a group	The teacher needed the time to organize the students within the groups

Guiding individual and investigation	both group	Prioritizing all of the groups to be guided	Dividing the time to guide the groups	There was insufficient time to guide the investigation
Developing and presenting the work		The students are not allowed to give responses	The students were not eager to deliver the result of the discussion	No students asked the question
Analyzing and evaluating the process of problem-solving		Limited time allotment	The feedback is not well-explored	The time allotment was insufficient

Based on Table 1, in the student's orientation phase onto the problem, the teacher posed a problem related to the material that will be learned. The students provided responses or questions individually about the information they may get. It was aimed to stimulate the students' curiosity about the solution to the problem. The obstacles occurred in this phase were because several causes, namely the teacher found it difficult to direct the students to the problem that needed the solution and the students were not accustomed to receiving the problems without the direction. Thus, the students were not trained to identify and understand the problem. Moreover, the students also had weak prior knowledge, and they were not accustomed to understanding the contextual problems because the Problem-Based Learning model has never been previously applied.

In the learning process using the ideal problem-based learning, the students began to identify the nature of the problem. They should expand their knowledge and try to find effective solutions. This process requires a structured and systematic approach in which the students are motivated to present the problem positively and systematically (Alrahlah, 2016). The results of Padmavathy & Mareesh (2013) show that the problem-based learning model is more effective in teaching mathematics. By adopting a problem-based learning model in teaching, the mathematics teacher can stimulate the students to think creatively, make important decisions, and solve the urgent problems in the world's competition. Also, the problem-based learning strategies affect the student's knowledge that provides greater opportunities for students to learn. They also have a chance to be more involved and to increase their active participation, motivation, and interest among them. It makes the students have a positive attitude towards mathematics and help them to improve their achievements that will result in long-term memory. It also provides new and desirable experiences for the students.

In the organizing phase of mathematics learning, the teacher gave the students the problems that have been written down in the student worksheet. They also got the instructions on what they should do in the group discussion. Based on the results of observations and interviews contained in table 1, it can be seen that the obstacles occurred when the teachers needed more time to organize the students into groups. The research was conducted in the third grade of elementary school; therefore, it took patience to arrange the students in their groups. The teachers had difficulty in directing the students to form groups as the classroom became rowdy. In this phase, the teacher had to organize the learning

tasks related to the problem. The students did not listen to the teacher's instructions carefully. It is only the smartest students that were willing to pay attention to the teacher. It was explained by the teacher of SDN Madyotaman as follows:

"What often happens is the clever students are more dominant in solving the problems. They should help other friends. It also happened to the less smart students that tend to ignore other friends and not try to participate".

Harun, *et al.* (2012) mentions that in the implementation of problem-based learning, the learners are trained to learn independently. It was proven that this method is effective to solve real problems existing in the students' lives. Hariadi & Wuriyanto (2016) describes a learning process that has the purpose of having an understanding of new information in the social principles of learning. The students in groups consisting of various abilities also can undertake the learning activities to understand new information.

In the phase of guiding both the individual and group investigations, the students were not accustomed to constructing the knowledge based on the given problem. Meanwhile, in the problem-based learning model, the students required to find out their knowledge. However, the concept error arose since the students were not accustomed to doing such a thing. Thus, teachers need to guide the process of group discussion. The obstacles occurred when the teacher found it difficult to divide the time to guide each group because each group asked at the same time. The classroom became very rowdy when the certain group asked the teacher; meanwhile, another group that also needed the teacher's explanation chose to wait for the teacher to approach their group. However, they did not do the worksheet so that the class atmosphere became noisy. This situation made the students lazy to solve problems that can be done in the group because the group did not get a chance to be guided first.

All groups want to be prioritized when teachers guide or pose the questions. These obstacles occur very often in the learning process. The students sometimes find that their teachers are unfair because teachers frequently do not meet their requests to ask questions in group activities. Also, the obstacles in this phase were largely caused by the lack of time allotment while working on the worksheet. Due to the lack of discussion time, many students did not maximally master the material. It will affect the next material understanding.

Etherington (2011) explains that there may be a diversity of solutions to a given problem. The students should be encouraged to investigate the basic principles underlying the system thoroughly. It means that the teacher makes constant reference to the importance of the observed pattern. Certain principles must be mastered in advance before it becomes possible to learn other things, such as solutions.

In the phase of developing and presenting the work, the students were directed to make a report of the discussion result to be presented in front of the class. Each member of the group should be involved in the presentation of the report because the creativity of each group is required to make the systematic report. Each group presented their work in front of the class. Communicating the results of

the discussion is an important step in learning. During the group presentation, the other group was asked to provide responses or questions so that concept errors could be clarified. However, none of the students was eager to respond or ask the question to the group who has the presentation in front of the class. Widiana & Jampel (2016) mentions that student interactions can work well if they are given the opportunities to work and discuss.

The phase of analyzing and evaluating the problem-solving process is a very important phase because the students will be given the feedback in a problem-solving process to make the learning meaningful. This phase is also used to emphasize the correct steps of the expected solution, as there may be many solutions for a certain problem. The obstacles faced in this phase was the limited time to explain the deep material of the problem-solving process done by the students. Therefore, the implementation of this phase was not maximal because the time was insufficient.

The results of Al-Bashir, Kabir, & Rahman (2016) study show that the teachers have an important role in improving their own students' ability to understand the process of self-regulation. They are also an essential source of external feedback. Good feedback not only can provide useful information in improving their learning, but it can also give the teachers proper information that ultimately enhances the learning experience for the students.

CONCLUSION

The obstacles experienced by teachers in the application of problem-based learning model occur at the planning stage and the implementation stage of each phase of the learning model. During the planning stage, the obstacles that occur are the teachers that require careful preparation in making the lesson plan. Also, in determining the problem, the teachers are reluctant to determine their problems, and they prefer to use the problem in textbooks. Furthermore, in the implementation stage, the obstacles experienced by the teachers are the lack of time allotment to maximize the activities in all phases. The implementation of problem-based learning required good time management to make the learning process run optimally. In the orientation phase of the problem, the obstacles that occur in this phase are the teacher difficulties in directing the students onto the problem that needs the solution; the students are not accustomed to experience the problems without guidance. Thus, the students are not trained to identify and understand the problem the phase of organizing the students to learn, the obstacles that occur is the teachers require sufficient time to organize the students in the group activities. In the phase of guiding both individual and group investigations, the teachers have difficulty in dividing the time to guide one group with another since each group asks at the same time.

Moreover, the students still wait for the teacher without doing it themselves in advance. In the phase of developing and presenting the work, the obstacle is to make the students actively ask or respond to the group that is doing the presentations. In the phase of analyzing and evaluating the process of problem-solving, the material explanation or feedback from problem-solving is not profound as the time is up. To face the obstacles that have been exposed, the teacher should prepare

the lesson plan in advance because it takes time and preparation. Furthermore, in determining the problem appropriately, the teachers should consider the problem criteria in the problem-based learning model. In the implementation of the learning, the teacher should consider the available time allotment and perform the classroom management well.

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